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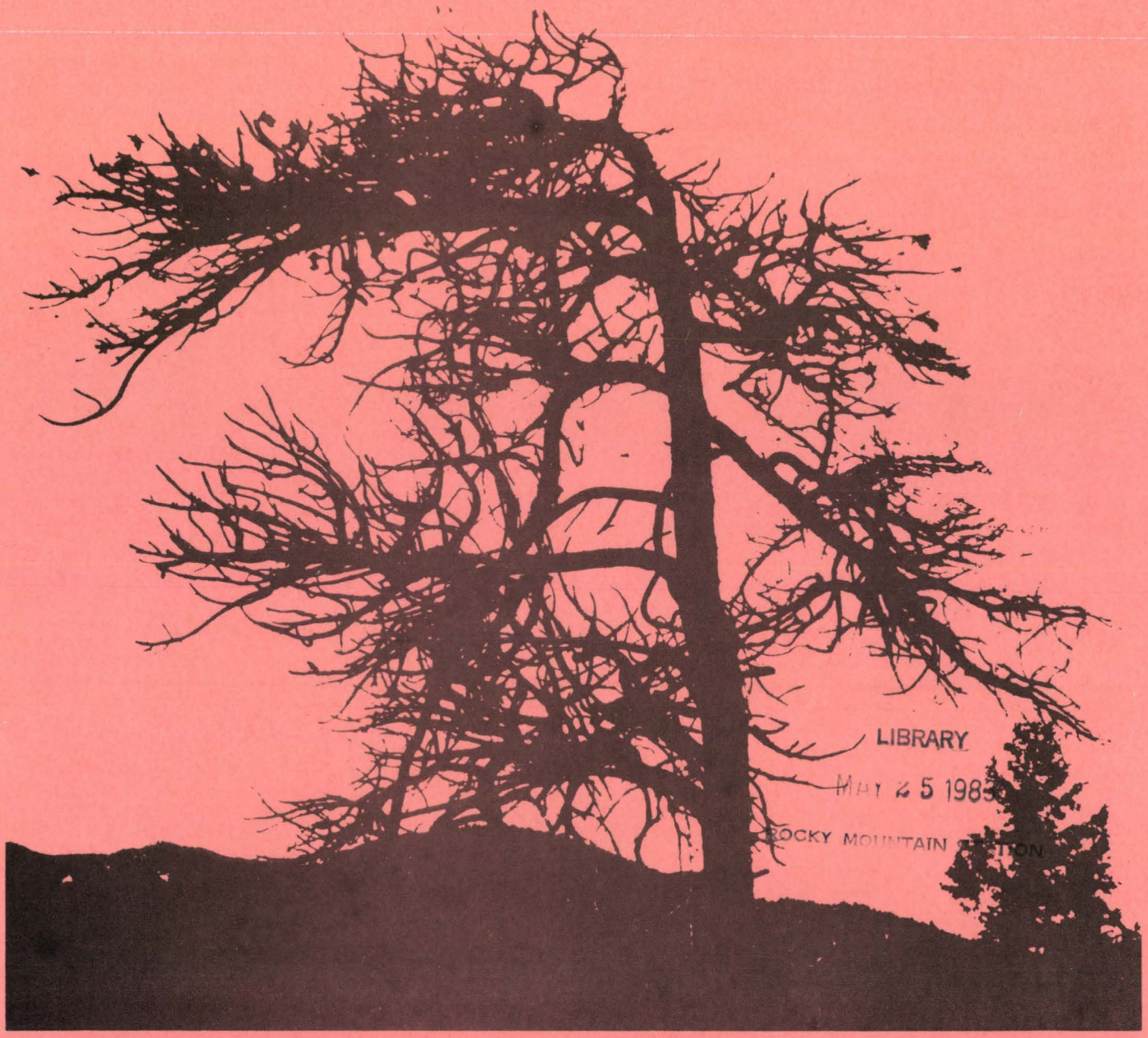
FOREST PEST MANAGEMENT

ANNUAL REPORT for 1980



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ROCKY MOUNTAIN STATION

OUR CAPABILITY TO DETECT AND EVALUATE INSECT AND DISEASE PROBLEMS IN THE REGION WAS LIMITED BY RESTRICTIONS TO CONSERVE FUEL. OUR COOPERATORS HAD SIMILAR RESTRICTIONS. CONSEQUENTLY, OUR REPORT IS LIMITED.

FOREST PEST MANAGEMENT

1980

ANNUAL REPORT

ROCKY MOUNTAIN REGION

by

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and

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Forest Pest Management
State and Private Forestry
Rocky Mountain Region
USDA Forest Service
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ACKNOWLEDGEMENT

The Forest Pest Management staff extends appreciation to all cooperators for aid in the preparation of this annual report. The following organizations contributed to this report: Colorado State Forest Service; Kansas State University and Cooperative Extension Service; South Dakota Department of Game, Fish and Parks, Division of Forestry; and Rocky Mountain Forest and Range Experiment Station, Forest Service, USDA.

INTRODUCTION

Forest Pest Management (FPM) is responsible for detection, evaluation, prevention and suppression of insects and diseases on forested lands within the National Forest System. Additionally, FPM administers assistance programs, both financial and technical, which are available to State and private landowners of forested lands through the Cooperative Forestry Assistance Act of 1978 (Public Law 95-313).

In 1980 ground and aerial surveys were used to detect insect and disease infestations throughout the Rocky Mountain region, many in cooperation with state pest specialists in Colorado, Kansas, Nebraska, South Dakota and Wyoming.

Information on specific pest problems may be obtained from FPM located at the Rocky Mountain Regional Office in Lakewood, Colorado (telephone 303-234-4877).

CONDITIONS IN BRIEF

Mountain pine beetle (MPB) remains the most destructive forest pest in the Rocky Mountain Region. Mortality of ponderosa pine caused by MPB in the Black Hills of South Dakota and Wyoming is nearly equal to that reported in 1979. The MPB population in this area is expected to remain at its current high level. Currently along the Colorado Front Range, MPB-caused mortality of ponderosa pine is currently declining. In areas of the White River, Routt and Arapaho National Forests, MPB-caused mortality of lodgepole pine is increasing. Very little beetle activity was detected on sites of previous infestations along the Big Horn Mountains and on the Medicine Bow and Shoshone National Forests.

The most significant defoliator of trees in the Region is the western spruce budworm. The major infestation occurs along the Colorado Front Range. The area defoliated by the budworm increased slightly over that reported in 1979.

Other insects causing noticeable tree damage in Region 2 included the western tent caterpillar, jack pine budworm, and the ponderosa pine needleminer.

Dwarf mistletoes are still the most important diseases in the Rocky Mountain Region. They are especially damaging to lodgepole pine in Colorado and Wyoming and to ponderosa pine in Colorado.

Important diseases in the Great Plains included: heart rot of green ash in shelterbelts and natural stands, diplodia tip blight, Dutch elm disease and decline of jack pine in the Nebraska National Forest. Numerous other less important diseases were also reported.

The pine wood nematode was reported in three additional counties in Kansas.

The Colorado State Forest Service and Cooperative Extension Service continued their participation in the Federal Dutch Elm Disease Demonstration Project. During 1980, one hundred and seventy confirmed cases of Dutch elm disease were reported in five project communities.

STATUS OF INSECTS

BARK BEETLES

MOUNTAIN PINE BEETLE: *Dendroctonus ponderosae* Hopkins

The Mountain pine beetle (MPB) continues to be the most significant forest pest in Colorado and the Black Hills of South Dakota and Wyoming. In addition, MPB also caused some losses in lodgepole pine, *Pinus contorta* Dougl., and ponderosa pine, *Pinus ponderosa* Dougl., on Casper Mountain south of Casper, Wyoming. This is a new discovery.

MPB populations in ponderosa pine in the Black Hills are expected to remain high, while the recent decline in population along the Colorado Front Range should continue. In lodgepole pine in Colorado, MPB populations are increasing in the following areas: the White River National Forest near the towns of Minturn and Eagle; the Routt National Forest near Steamboat Lake; and on the Arapaho National Forest near the towns of Dillon and Tabernash.

Tree mortality estimates for Colorado west of the continental divide were obtained from an aerial survey while estimates for the Front Range were obtained from a survey involving high-altitude panoramic photography and a follow-up ground survey. From these surveys it was determined that approximately 135,000 trees on 78,340 acres Statewide were killed by the mountain pine beetle in 1980. This estimate includes approximately 43,000 trees which were removed in the course of prevention and suppression activities prior to the survey. The total does not include an undetermined number of trees removed by firewood gatherers.

In the Black Hills of South Dakota approximately 350,000 trees were killed by MPB on an estimated 300,000 acres.

SPRUCE BEETLE: *Dendroctonus rufipennis* (Kirby)

The Spruce beetle remains endemic throughout the Region. Only scattered areas of damage by this insect were detected. The largest area of spruce, *Picea* spp., mortality caused by this insect was about 200 acres on Rabbit Ears Mountain on the Routt National Forest. Several groups of newly attacked spruce and freshly killed spruce recently abandoned by the beetles were encountered. This infestation was apparently associated with scattered windthrown spruce throughout the area.

Other areas of windthrown spruce, as well as ski areas having new runs cut through spruce stands were surveyed, but no beetle problems were found.

MOUNTAIN PINE BEETLE[1]

Colorado - East of Continental Divide[2]

Ownership	Outbreak Area (Thousand Acres)	Number of Trees (Thousand)	Mortality (M cu.ft.)
National Forest	30.516	38.192	454.196
Other Federal	10.980	13.742	163.434
State	1.851	2.317	27.555
Private	20.493	25.647	305.014
Total	63.840[3]	79.898	950.199

Colorado - West of the Continental Divide[4]

	Outbreak Area (Thousand Acres)	Number of Trees (Thousand)	Mortality (M cu.ft.)[5]
National Forest	7.189	6.000	90.000
Other Federal	.930	.776	11.640
State	.580	.484	7.260
Private	5.801	4.842	72.630
Total	14.500	12.102	181.530

South Dakota[6]

	Outbreak Area (Thousand Acres)	Number of Trees (Thousand)	(M cu.ft.)[7]
National Forest	200.100	233.450	3968.650
Other Federal	7.900	9.217	256.689
State	14.000	16.333	277.661
Private	78.000	91.000	1547.000
Total	300.000	350.000	5950.000

1/ A FIDIS survey is scheduled for Wyoming in 1981.
2/ These data were obtained from a survey along the Colorado Front Range utilizing high altitude panoramic photography and ground truth.
3/ This total includes neither the approx. 43,000 trees removed in the course of prevention and suppression activities nor the undetermined number of trees removed by firewood gatherers, prior to the survey.
4/ These data were obtained from an aerial survey.
5/ Calculated by using 15 cubic feet per tree.
6/ These data were obtained from an aerial survey.
7/ Calculated by using 17 cubic feet per tree.

DOUGLAS-FIR BEETLE: *Dendroctonus pseudotsugae* Hopkins

Douglas-fir beetle populations occur in small scattered pockets throughout the Region. Most significantly, Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco, killed by this insect were detected near Vallecito Reservoir on the San Juan National Forest and on a few steep slopes of Sleeping Ute Mountain west of Cortez, Colorado.

DEFOLIATORS

WESTERN SPRUCE BUDWORM: *Choristoneura occidentalis* Freeman

Western spruce budworm remains the most serious defoliator in the Rocky Mountain Region. The budworm caused noticeable defoliation on approximately 1,052,000 acres of Douglas-fir and white fir, *Abies concolor* (Gord. & Glend.) in Colorado. This is a slight increase over that reported in 1979.

Egg mass surveys conducted this year indicate that in 1981 budworm population levels will be moderate to heavy on the Pike and Roosevelt National Forests and light on the San Isabel National Forest.

JACK PINE BUDWORM: *Choristoneura pinus* Freeman

Approximately 2,400 acres of scattered jack pine, *Pinus banksiana* Lamb., stands on the Bessey Ranger District, Nebraska National Forest, had moderate to high jack pine budworm levels, as was projected from 1979 egg mass sampling data. A pilot suppression project was conducted in June during which *Bacillus thuringiensis* Berliner, was applied aerially to about 2,000 acres of jack pine. Preliminary analyses of pre- and post-spray larval sampling data indicate a substantial jack pine budworm population reduction in treated areas. However, defoliation did not appear to be reduced significantly in these areas.

Results of late summer egg mass sampling indicate a low potential for significant budworm activity in most jack pine stands in 1981.

WESTERN TENT CATERPILLAR: *Malacosoma californicum* (Packard)

Severe aspen, *Populus tremuloides* Michx., defoliation by the western tent caterpillar again occurred on about 18,000 acres of the San Juan National Forest in the vicinity of V-Rock Mountain near Pagosa Springs, Colorado. This outbreak was first reported in 1976. Severe defoliation occurred on approximately 7,500 acres in 1977, 8,000 acres in 1978, and 16,000 acres in 1979. This year, the defoliated area did not differ significantly from the area defoliated in 1979, with the exception of approximately 1800 acres of scattered defoliation on private lands east of the Navajo

River. Results of an egg mass survey conducted this fall indicate that there could be a sufficient tent caterpillar population to cause heavy defoliation again in 1981.

DOUGLAS-FIR TUSSOCK MOTH: *Orgyia pseudotsugata* (McDunnough)

Douglas-fir tussock moth continues to be a problem of ornamental fir and spruce in the Colorado Springs and Denver metropolitan areas. However, no defoliation was noted in forested areas.

ELM LEAF BEETLE: *Pyrrhalta luteola* (Muller)

The elm leaf beetle remains a Regionwide nuisance on ornamental elms, *Ulmus* spp., in many of the urban areas and shelterbelts. In Rapid City, South Dakota and sections of Colorado, for example, elms were completely defoliated by the beetle.

PONDEROSA PINE NEEDLE MINER: *Coleotechnites ponderosae* Hodges & Stevens, n.sp.

Damage to ponderosa pine by this insect was detected on a large area of the Colorado Front Range, the Uncompahgre Plateau in Montrose and San Miguel Counties, and in scattered pockets in the vicinity of Vallecito Reservoir in LaPlata County, Colorado. The area of infestation has increased in the last few years.

WESTERN SPRUCE BUDWORM

Outbreak Area

	TOTAL (thousand acres)
National Forest	526
Other Federal	64
State, County, Municipal	42
Private	420
TOTAL	1,052

MISCELLANEOUS INSECTS

INSECT	HOST	LOCATION	REMARKS
Ips pini (Say)	*Pinus* spp.	South Dakota	subdivisions in Rapid City
		Colorado	Boulder & El Paso Counties
I. calligraphus (Germar)	*Pinus* spp.	South Dakota	subdivisions in Rapid City
Pissodes strobi (Peck)	Engelmann spruce	Wyoming	Sheridan County
		Colorado	Scattered local populations Statewide
Hyphantria cunea (Drury)	Cottonwoods, willows	Region-wide	Scattered local populations Regionwide
Choristoneura lambertiana (Busck)	Ponderosa pine	Colorado	Highway 285 near Conifer and several Front Range canyons
Taniva albolineana (Kearfott)	*Picea* spp.	South Dakota	Rapid City, East River region
		Colorado	Urban areas statewide
Phyllocnistis populiella Chambers	Aspen	South Dakota	Black Hills
Rhyacionia spp.	*Pinus* spp.	South Dakota	Black Hills, Huron, Pierre, Aberdeen, Yankton, Sioux Falls
		Colorado	Statewide, esp. eastern plains

MISCELLANEOUS INSECTS (continued)

INSECT	HOST	LOCATION	REMARKS
Petrova spp.	*Pinus* spp.	South Dakota	Watertown, Sioux Falls
		Colorado	Statewide, esp. lower elevations
Dioryctria zimmermani (Grote)	Zimmermann pine	South Dakota	Trip and Minnehaha Counties
		Colorado	Northwest Counties (Yuma, Sedgwick, Logan, Phillips)
Paleacrita vernata (Peck)	Siberian and American Elms	South Dakota	Rapid City, Aberdeen, and Sioux Falls
Pineus sp.	Lodgepole pine	Wyoming	Albany County, near Rob Roy Reservoir and Fox Park
Prionoxystus robiniae (Peck)	Siberian elm	Colorado	Windbreaks throughout eastern plains
Podosesia syringae fraxini (Lugger)	European ash and Green ash	Colorado	Grand Junction and other urban areas

STATUS OF DISEASES

DWARF MISTLETOES: *Arceuthobium americanum* Nutt.

Five year work plans for survey and suppression of lodgepole pine dwarf mistletoe were completed for the Red Feather Ranger District, Roosevelt National Forests and the Wyoming State Forest Service. These plans outline a systematic control strategy for control of dwarf mistletoe, thus allowing more efficient budgeting than was possible in the past.

Presuppression surveys for lodgepole pine dwarf mistletoe were conducted on 17,000 acres on the Gunnison National Forest; 2,600 acres on the Arapaho and Roosevelt National Forests; 7,600 acres on the Shoshone National Forest; and 600 acres on State lands in Wyoming.

Control Operations. Dwarf mistletoe infested, non-merchantable, overstory lodgepole pine was cut on 186 acres on the Arapaho and Roosevelt National Forests; 507 acres on the Shoshone National Forest; and 557 acres on State lands in Wyoming.

Projects. A special project was initiated on the Pingree Park Campus of Colorado State University to demonstrate to forest resource managers and the general public various techniques available for reducing losses from *A. americanum*. A series of treated and non-treated plots are posted with informational signs on the biology, impact, and control strategy used for dwarf mistletoe. The objective of the demonstration project is to create a visual, easily understood, and attractive information system.

A study was initiated to quantify the effects of dwarf mistletoe on cone and seed production in ponderosa pine and lodgepole pine. This information is needed by forest managers to determine which mistletoe-infested trees are suitable for "leave trees" in seed tree and shelterwood cuttings.

STEM DISEASES

ASH HEARTROT: *Fomes fraxinophilus* (Peck) Sacc.

Ash heartrot continued to cause damage to green ash, *Fraxinus pennsylvanica* var. *lanceolata* (Borkh.) Sarg., in the Great Plains. Stem decay caused by the fungus is common in natural hardwood stands in central and eastern Nebraska. Approximately 9% of the trees in 19 counties examined in 1980 are infected. Western Nebraska will be surveyed in 1981. The disease is State wide in South Dakota but appears most prevalent in southeastern South Dakota. Severe infections of green ash in a shelterbelt near Tyndall, Bon Homme County, combined with wind breakage and mortality are eliminating ash from that shelterbelt. The disease was also reported in Custer National Forest and Farm Island State Park in South Dakota.

HONEYLOCUST CANKER: *Thyronectria austro-americana* (Speg.) Seeler

Honeylocust canker was detected on honeylocust, *Gleditsia* spp., in four counties in South Dakota and in southwest Kansas and several areas of Colorado. Cankered trees in a field shelterbelt in Sully County, South Dakota suffered severe wind damage.

BROOM RUST: *Chrysomyxa arctostaphyli* Diet. and *Melampsorella caryophyllacearum* Schroet.

Broom rusts on Engelmann spruce (*Picea engelmannii* Perry), white fir and subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.) occurred on six National Forests (Gunnison, Uncompahgre, San Juan, Rio Grande, White River, and Arapaho) in Colorado. In approximately 20,000 trees over 79 square miles the average disease incidence was 4.2% for spruce and 2.3% for fir. Rust incidence was lower on seedlings and saplings than on pole and sawtimber-size trees. Spruce broom rust was common on most sites; the highest incidence was 28% on pole-size trees of the Pine Ranger District, San Juan National Forest. Fir broom rust was common on white fir on the San Juan and Rio Grande National Forests, but rare on all sampled subalpine fir. More brooms were found on dead spruce and fir than on live trees. Almost half the brooms on diseased spruce and about one-fifth of the brooms on infected fir were within one foot of the bole. Most dead broomed spruce and fir trees had associated bole cankers. Trees with brooms near the bole and trees with bole cankers are affected by the disease more than trees with a few small branch brooms.

VASCULAR WILTS

DUTCH ELM DISEASE: *Ceratocystis ulmi* (Buism.) C. Mor.

The Colorado State Forest Service and the Cooperative Extension Service continued participation in the Federal Dutch Elm Disease (DED) Demonstration Project. Sixty-eight areas in Colorado reported 761 confirmed cases of DED; another 217 cases were reported from Colorado Springs without benefit of culture. In 1980, four of five Colorado communities participating in the project had a reduced rate of Dutch elm disease infection. Three of the communities, Canon City, Eaton, and Grand Junction, had significant reduction in the infection rate. La Junta's increase of 0.1% was insignificant.

Total large-leaf elm removals (positive cases, plus beetle condemned trees) were under 4% in all cases. La Junta's 3.7% loss was the highest and reflects problems due to a severe winter storm in March 1980. Yuma's total large-leaf elm losses decreased from 1.9% to 1.5%. This is the third consecutive year that Yuma has had the lowest large-leaf elm loss level.

Colorado's 1980 Utilization Program was directed toward use of elms as firewood. The production of wood chips for use in continuous feed furnaces was not economical. Fumigating small bolts proved biologically feasible for at least one year, however, an economic comparison with other firewood sources was not made. Splitting and drying was not biologically practical, while splitting and debarking was economically impractical.

In South Dakota Dutch elm disease is causing significant losses of native American elms in natural woody draws in the West River prairie and the Black Hills. A new report was made in Sturgis, Meade County. In Aberdeen, only 30 confirmed cases of Dutch elm disease were reported. This low incidence is probably due to a strict, well-enforced city ordinance regarding the cutting and storing of elmwood, and a very successful sanitation program carried out by City Parks and Forestry personnel.

PINE WOOD NEMATODE: *Bursaphelenchus lignicolus* Mamiya & Kiyohara

Pine wood nematode was detected on Austrian pine, *P. nigra* Arnold, and Scots pine, *P. sylvestris* L., in three counties in southeast Kansas. No evidence of rapid spread has been detected. It has not been detected in forest situations.

ROOT DISEASES

Little is known about the causes, distribution, and impact of root diseases in the Region, consequently emphasis has been placed on surveys to ascertain the current and potential role of such diseases on National Forest management within the Region. As part of these efforts roadside surveys were done to locate and document root disease-associated tree mortality within portions of several National Forests.

SHOESTRING ROOT ROT: *Armillariella mellea* (Vahl. ex. Fr.) Karst.

Shoestring root rot is common in all conifer types within the Region. This disease is on the increase within the subalpine fir type. Surveys near Telluride, Colorado showed an incidence of 21%, about 10% of these trees infected by *A. mellea* were also attacked by western balsam bark beetle, *Dryocoetes confusus* Swaine. Root rot surveys were also conducted on the Grand Mesa, Gunnison, and San Isabel National Forests in the subalpine fir type. Incidence of *A. mellea* killed trees averaged 7.2% with 92% of these trees attacked by the western balsam bark beetle. Further root rot surveys are planned for 1981 in subalpine fir types of Colorado.

BLACK STAIN ROOT DISEASE: *Ceratocystis wageneri* Coheen & Cobb
(= *Verticicladiella wagenerii* Kendrick)

Black stain root disease, is common on pinyon, *Pinus edulis* Engelm., west of the continental divide in Colorado. Studies on insect vectors, rate of spread, and control measures are scheduled to start in 1981.

FOLIAGE DISEASES

DIPLODIA TIP BLIGHT: *Diplodia pinea* (Desm.) Kickx.

Diplodia was observed in four counties in South Dakota and confirmed at nine additional locations in the Black Hills. A survey was made in June to determine the extent of the disease in the Black Hills. Results of the survey indicated affected trees were located mostly in openings and along the edge of stands. Individual tree infection varied greatly, but tree mortality was uncommon. Severely affected trees had numerous dead branches. The scattered nature of the disease throughout the Black Hills suggests the fungus is not a recent introduction, but may be native.

In Lincoln County, South Dakota a shelterbelt was infested so heavily with *D. pinea* that mortality did occur. The problem is so severe that a renovation plan for the shelterbelt calls for removal of the pines and replacement with spruce.

In Kansas disease incidence was greatly reduced presumably because of light and sporadic rainfall during critical infection periods.

LODGEPOLE PINE NEEDLECAST: *Lophodermella concolor* (Dearn.) Dark

Needlecast occurred along roadsides in the vicinity of Sandstone Creek, Hayden Ranger District, Medicine Bow National Forest on scattered sapling and pole size lodgepole pine.

NURSERY DISEASES AND STUDIES

PINE CHLOROSIS AND MORTALITY: *Phoma* sp.

Lodgepole pine and ponderosa pine 1-0 and 2-0 stock at Bessey Nursery, Nebraska experienced chlorosis and mortality associated with *Phoma* sp. Root pruning during a drought period followed by heavy overhead irrigation contributed to disease development.

MYCORRHIZAE: *Pisolithus tinctorius* (Pers.) Coker and Carch

The National Mycorrhizal Study, which was coordinated by the Institute for Mycorrhizal Research and Development, has been terminated in Region 2. Nursery problems and very low levels of infection of seedlings prevented outplanting.

ABIOTIC DISEASES

WINTER DRYING

Winter drying injury or "red belt" was observed in several canyons west of Colorado Springs, Colorado during May 1980. Coniferous species injured were Douglas-fir, ponderosa pine, limber pine, and Rocky Mountain juniper. All ages of needles were injured. Tree mortality was not common.

AIR POLLUTION DAMAGE

Denver, Colorado has an air pollution problem. It has a dense emission pattern typical of an urban region dependent on automobile commuting. Photochemical air pollution is known to cause damage to a wide range of plants. Surveys were conducted to determine if damage by photochemical air pollution is occurring on ponderosa pine.

In 25 areas within and adjacent to metro Denver 1,382 trees were examined for ozone injury. Trees southeast of Denver exhibited shortened needles and reductions of needle complement. Chlorotic mottling was not observed, although chlorotic banding of foliage was occasionally found on trees within the areas surveyed. It is not known if these symptoms are expressions of air pollution injury. This survey was a preliminary effort to record the current situation and evaluate the potential for air pollution damage. The evaluation plots should provide useful information on changes in foliar injury over time.

OTHER DISEASES R-2

DISEASE	HOST	LOCATION	REMARKS
Gymnosporangium sp.	Rocky Mt. Juniper Hawthorn	Colorado	
Lirula abietis-concoloris (Mayrex Dearn.)	white fir	Colorado	
Marssonina populi (Lib.) Magn.	Aspen, eastern cottonwood	Colorado	
Nectria cinnabarina Tode ex Fr.	Siberian elm, Russian olive, locust, mulberry, birch	Colorado	Larimer, El Paso, Mesa Washington counties
Phomopsis juniperovora Hahn	eastern redcedar	South Dakota	Tripp, Lincoln counties
Puccinia sparganioides Ell. & Barth.	green ash	South Dakota	Redfield, Spink counties
Botryosphaeria ribes Gross. & Dug.	Siberian elm	South Dakota	Tripp county
Botryodiplodia hypodermia	Siberian elm	Statewide, South Dakota	Severe in Rapid City
Crytosphaeria populina Pers.	aspen	Colorado	El Paso County

OTHER DISEASES (continued)

DISEASE	HOST	LOCATION	REMARKS
Cytospora spp.	cottonwood	Kansas	Common occurrence on trees under stress due to hot, dry weather or herbicide damage.
	cottonwood, willow, and poplar	South Dakota	Statewide, with scattered mortality in Pierre and Huron
	poplar, Engelmann spruce, mountain ash, cherry, willow, Russian olive, blue spruce	Colorado	Observed in 11 counties of central and western Colorado and one eastern county.
Erwinia amylovora (Burr.)	apple	Colorado	Statewide
	apple	South Dakota	Statewide
Erwinia nimipressuralis Cart.	Siberian elm, poplar	Colorado	Statewide
Gloeosporium spp.	Black walnut, silver maple	South Dakota	Beadle, Brooking, and Lincoln counties

FOREST PEST MANAGEMENT WORKSHOPS

During the past year the Forest Pest Management staff offered classroom and field training in recognition and suppression of major forest insects and diseases in the Region. Training consisted of two-day workshops held in Fort Collins, Colorado and Rapid City, South Dakota. These sessions were attended by National Forest, other Federal and state forest resource management personnel. A special two-day workshop on recognition and reduction of hazardous trees in recreation sites was held on the San Juan National Forest.

PESTICIDE USE IN REGION 2.

TYPE OF PESTICIDE	TARGET PEST	CHEMICAL USED	UNITS [1] APPLIED	APPLICATION METHOD	USER
Herbicide	Weed control in nursery beds or other noxious weed control.	BIFENOX	31	G	I
		DCPA	60	G	I
		2,4-D	1036	G	I, II, III
		DIPHENAMID	22	G	I
		SIMAZINE	8	G	I
		DICAMBA	269	G	I, II
		GLYPHOSPHATE	162	G	I
		PICLORAM	2747	G	I, II, III
	Aspen regeneration study	2,4-D & 2,4-DP mixture	7	A	I
	Sand sagebrush/Range improvement	2,4-D	9950	A	III
	Big sagebrush/Range improvement	2,4-D	150	G	III
Fungicide	Phomopsis blight in nursery beds.	BENOMYL	5	G	I
	Various fungi in greenhouse	BENOMYL	1.5[2]	G	I
		CAPTAN	> 1	G	I
	Shot hole disease in nursery beds.	ZINEB	1	G	I
Fumigant	Damping off fungi, weeds, weed seeds, & nematodes in nursery beds.	METHYL BROMIDE	23	G	I
Insecticide	Mountain pine beetle	CARBARYL	1483[3]	G	I
		LINDANE	250[3]	G	I
		ETHYLENE DIBROMIDE	5000	G	II
	Pine tip moths	DIMETHOATE	3	G	I
	Cottonwood leaf beetle	CARBARYL	2	G	I
	Jack pine budworm	BACILLUS THURINGIENSIS-Bt	4014	A	I
	Grasshoppers/range protection	MALATHION	11,549	A	II
	Lice & flies/livestock protection	COUMAPHOS	150[5]	G	III
		TOXAPHENE	3000[5]	G	III
	Western spruce budworm	CARBARYL	1000	A	IIII
		ACEPHATE	4000	A	IIII
Repellant	Seed Treatment in nursery	THIRAM	6	G	I
Rodenticide	Prairie dogs/range rehabilitation	ZINC PHOSPHIDE	19,421	G	I

Users: I - U.S. Forest Service
II - Other federal or public agencies
III - Permittees, licensees & grantees
IIII - Private organizations
A - Aerial application
G - Ground application

[1] Units are in acres unless otherwise indicated
[2] Million seedlings
[3] Trees
[4] Cords
[5] Heads of cattle

USDA FOREST SERVICE DETECTION REPORT

FOREST INSECT AND DISEASE DAMAGE

FORM 3400-1

To encourage forest pest reporting for the Rocky Mountain Region, all interested agencies and individuals are invited to complete Form 3400-1. Instructions for completing the report are found at the top of each form. Form 3400-1 is available upon request from: (1) Forest Pest Management, (2) State and Private Forestry, (3) Forest Service, (4) 11177 W. 8th Avenue, (5) Post Office Box 25127, (6) Lakewood, Colorado 80225, Phone (303) 234-4877.

Whenever possible, insect or disease specimens or damage samples should be submitted with the report. Resource managers of Federal forest lands should submit specimens to the Forest Pest Management Staff at the above address. Managers of non-Federal forested lands in Colorado, Kansas, Nebraska, South Dakota, and Wyoming should send detection reports and specimens to their respective state forestry organizations at the following addresses:

STATE FORESTRY ORGANIZATIONS

Colorado State Forest Service
State Forester - Thomas B. Borden
Colorado State University
Fort Collins, Colorado 80523
Telephone: (303)482-8185,
491-6303/6304/6305

Department of Game, Fish and Parks
Director of Forestry -
James D. Verville
Sigurd Anderson Building
Pierre, South Dakota 57501
Telephone: (605) 773-3623

Kansas State and Extension Forestry
State and Extension Forester -
Harold G. Gallaher
Forestry Building, 2610 Claflin Road
nhattan, Kansas 66502
lephone: (913) 532-5752

Wyoming State Forestry Division
State Forester - Carl E. Johnson
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